

***Determining the Composition and Collectibility
of Child Support Arrearages***

**MAPS Unit
Division of Child Support
Washington State DSHS
P.O. Box 9162
Olympia, WA 98507**

**Semi-Annual Performance Report of the Research Project
New Approaches to Collecting Child Support Arrearages:
Determining the Composition and Collectibility of Arrearages**

**Fifth Report
April 2002**

**Submitted to the Office of Child Support Enforcement
Administration for Children and Families
U.S. Department of Health and Human Services
Washington, D.C.**

Grant Number 90-FD-0027

**Washington State Department of Social and Health Services • Economic
Services Administration • Division of Child Support, P.O. Box 9162,
Olympia, WA 98507 • (360) 664-5005 • FAX (360) 586-3274**

Determining the Composition and Collectibility of Child Support Arrearages

Fifth Performance Report

This semi-annual progress report covers project activities for the period October 2001 - March 2002. The report has two sections. The first includes a brief statement of the project plan and summary of accomplishments. In the second part Carl Formoso presents some findings from his recent work on the macroanalysis. This work uses different methods than the two predictive models he has previously presented as aids to predicting child support debt behavior. The financial status report will be sent separately.

Project Plan

This is a study to determine the patterns of debt behavior in Washington State child support cases. Our goals are to understand the processes and components of child support that lead to large debts; document the mitigating effects of interventions on collectibility; determine the impact of law and policies on debt growth; and recommend changes that will lead to lower arrearages.

To accomplish these goals, our objectives in this project are as follows:

- To quantify the rate of arrearage growth;
- To develop a model to predict debt growth outcomes and collectibility;
- To quantify the interaction of parents' usage of public assistance programs, participation in work activity programs, and payment of child support to determine the impact of interventions on debt collectibility;
- To document which field interventions are most effective in working older cases with high arrearages;
- To document the effect of Washington State's statutes, codes, and policies on the life cycle of the child support debt process;
- To prepare recommendations for changes necessary to optimize collectibility of debts, write off bad debt, and minimize future arrearage building;
- To evaluate the effectiveness of DCS programs in light of the federal incentive measure on arrears.

There are several parts to this study. The main part of the project is based on construction and analysis of a large database containing information on child support cases, noncustodial parents, other parties to the cases, and other public program usage. Carl Formoso constructed the database and has

conducted longitudinal data analysis, neural network analysis, and decision tree analysis to develop a model for predicting debt outcomes.

The center of the study is the cohort of all identifiable noncustodial parents (241,731 persons) with open child support cases present on SEMS (the DCS case management computer system) in third quarter 1995. Our longitudinal database enables us to track these individuals for 15 quarters, from fourth quarter 1993 to second quarter 1997. With this cohort we can look back seven quarters and forward seven quarters. This period was chosen because it is a relatively stable period before welfare reform was implemented. The model can then be applied to other time frames.

Through cross-matches with other administrative databases, we can measure networks of program usage, such as public assistance, mental health or alcohol/drug treatment, or vocational rehabilitation.

During the project Carl Formoso has analyzed these data to determine the distribution of arrears patterns (increasing, decreasing, remained same, intermittent). He has used the techniques of logistic and neural network modeling, decision tree modeling, and survival analysis to develop the model for predicting debt outcomes.

The second major part of the study is a case assessment based upon stratified samples representing debt patterns identified by the longitudinal analysis. Its focus is an intensive review of the cases to capture information from case comments and other sources not preserved in SEMS flatfiles and other administrative databases. The case assessment is retrospective, rather than predictive.

This two-tiered analysis of debt patterns on child support cases will allow us to quantify the rate of arrearage change, reliably predict direction of debt change, and explain why the patterns occur. We want to document not only what is happening, but also why it is happening.

Achievements

The project began in October 1999. We have completed the research phases of collection and analysis of child support data. Presently we are writing the final report and sharing our results within the agency.

This section summarizes progress toward accomplishing the project's objectives in various parts of the study.

Neural Network Prediction Model

Development of a prediction tool for child support arrearage debt was reported in our third progress report.¹ This tool is able to predict, with up to about 80% accuracy, the direction of change in arrearage debt for individual noncustodial parents (NCPs). The tool uses neural network simulation modeling, requires client information from an eight quarter base period, and makes predictions for three quarters in the future or seven quarters in the future.

Our approach was to first select a small number of data elements (variables) which appeared to have predictive power and then to develop an optimum model to obtain the best predictions. Starting with over one hundred variables, a series of tests resulted in ten variables that consistently showed predictive power. Eight of these are from DCS history, one is earnings history, and one is welfare history. We show that predictability can be improved by inclusion of eight variables derived from history of use of public services and possibly three variables derived from the case studies detailed elsewhere in this report, but these variables are not included in the general models since we do not have this information for all members of the cohort, and this information would usually not be available in applications of the models.

The prediction tool does not attempt to make predictions for all NCPs submitted, but is able to select those NCPs for whom outcomes can be more reliably predicted. It appears that for a general group of NCPs third quarter predictions will be made for about 60% of the individuals and up to about 75% of the predictions will be correct; seventh quarter predictions will be made for about 50% of the individuals and up to about 70% of the predictions will be correct. Better predictions can be made by pre-selecting individuals based on their history. For example, pre-selecting individuals with the highest earnings allowed third quarter predictions to be made for 80% of the individuals and 83% of the predictions were correct. Applications of the prediction tool to newly defined NCP cohorts show promising results.

Decision Tree Model

A second, simpler, prediction tool for child support arrearage debt was developed using inductive decision tree modeling.² This tool is easier to understand and is useful for making quick predictions, but it is not as powerful as the previously developed neural network tool. From a general group of non-custodial parents (NCPs) this tool is able to select a 10% sub-group of individuals who have about an 80% probability of increased arrearage three

¹ A detailed discussion of the data sources, methodology, and early work on developing the predictive model was provided as Part 2 of the *Second Performance Report*, October 2000, pp. 19-36. The Neural Network Prediction Model was discussed in the *Third Performance Report*, April 2001, pp. 4-5.

² The Decision Tree Model was presented in the *Fourth Performance Report*, November 2001, pp. 5-9.

quarters in the future, and a different 10% sub-group who have about an 8% probability of increased arrearage three quarters in the future.

Case Assessment Work

We hired an experienced support enforcement officer (SEO) as research analyst to review the sample cases on SEMS and enter data into an Access datafile. This was far more complex than most coding and data entry work. It required a thorough knowledge of DCS and the IV-D program and ability to maneuver through both IV-A and IV-D computer systems.

Jeannie Anthony (now Bowen) worked on the project from August 2000 through February 2001. She participated in developing the case assessment questionnaire. In addition to drafting some of the questions, she helped to translate the written instrument into Microsoft Access format. She reviewed the sample cases on SEMS and coded information directly into the Access file. (The case assessment questionnaire was included in our second performance report.)³

Jo Peters then incorporated the coded assessment into a much larger database for the sample parents, working in SPSS. The file includes data matches with SEMS extracts, providing detail on order history and updated payment records.

Our fourth performance report included a preliminary analysis of the case assessment findings.⁴ The main findings presented in that report can be summarized as follows. The most interesting results pertained to the noncustodial parents in the Increasing debt pattern. An examination of the relationship between monthly current support amount, reported wages for covered employment, support payments, and changes in debt over the 15-quarter period showed that the ratio of monthly order amount to wages was not appropriate for these NCPs; on average, the order amounts were higher than the monthly earnings. The median MTW ratio for the Increasing debt pattern was 1.72, compared to .057, .193, and .114 for the other three patterns.

The case assessment also found that barriers to collection (multiple cases, corrections records, history of public assistance) are correlated with debt pattern. Again, the Increasing debt pattern shows the heaviest concentration of these barriers. We also found that many of the noncustodial parents in the sample are also custodial parents on other IV-D cases. The concentration was heaviest among the Intermittent debt pattern, where 20 percent of the NCPs were also custodial parents.

Jo Peters is now writing the final report on the case assessment.

³ *Second Performance Report*, October 2000, Appendix B, pp. 7-16.

⁴ *Fourth Performance Report*, November 2001, pp. 10-48.

Review of Programs, Policies, Initiatives

A third part of the study was substantially completed during the first six months of the project. We examined the contribution of various programs, including federally mandated ones, to increasing DCS collections on child support arrears. We examined DCS field office pilot projects and other local initiatives to assess their role in reducing child support debt. Of particular interest were field office projects implemented as part of Washington's welfare-to-work program. We also investigated projects specifically aimed at hard-to-work cases with large debts. Our first progress report discussed DCS initiatives in some detail.⁵

Our first progress report also discussed the impact of certain statutes and policies, such as the statute of limitations on child support debt, requiring the noncustodial parent to sign a waiver of the statute in return for lowering monthly payment amounts, and the use of imputed income in setting order amounts. The report reviewed current DCS initiatives aimed at speeding up and simplifying the process of correcting orders. It discussed initiatives to streamline the debt reduction process as well.

Review of Washington State Law on Child Support Debt

A fourth part of the study is to review Washington statutes and policies that govern how child support debt is handled over the lifetime of the case. Washington law contains provisions for charging off child support debts deemed uncollectible or reducing such debts for hardship when the debts are owed to the state (i.e., DSHS). Such reviews are conducted on a case-by-case basis as requested.

How does Washington law limit or facilitate changes in DCS policy and procedure if the agency wishes to expedite debt write-offs or modify orders? We hired an outside attorney as a consultant to address these questions. Karen Lundahl is presently completing this analysis for the project.

Karen Lundahl has an extremely useful blend of experience as a Support Enforcement Officer for the State of Washington child support agency and an extensive background in law. Ms. Lundahl has five years of experience as a Support Enforcement Officer in the state of Washington. After completing law school at the University of Puget Sound, she established herself as a family law expert. Her legal background includes family law practice, drafting revisions to RCW 74.20A "Support of Dependent Children - Alternative Method," and twelve years as an Assistant Attorney General who handled child support enforcement issues. In addition to this background, her work as session counsel for the Senate Judiciary Committee during the 1999-2000 legislative session gave her recent experience in analyzing and drafting statutes.

⁵ *First Performance Report*, May 2000, especially pp. 18-38.

Sharing Research Findings

While working on the final report, the research investigators have been sharing some of the most important findings with child support professionals in Washington State. Jo Peters participated in a panel at the Family Support Council in October. This annual statewide conference brings together prosecutors and DCS staff to discuss child support issues. She discussed findings from both the earlier hard-to-collect cases project and the arrearages project in her panel presentation.

In November Carl Formoso was invited by DCS management to present his Decision Tree model to the statewide DCS Leadership Team, consisting of headquarters managers and regional administrators from the field offices. He showed how staff could use the decision tree model to help identify cases needing modification or other types of special attention.

In January Carl Formoso and Jo Peters together presented findings from the arrearage project to the statewide Leadership Team. Here they discussed the relevance of the MTW ratio to the debt patterns of noncustodial parents. They emphasized the impact of inappropriate monthly order amounts in escalating debt. But Carl's findings also showed that MTW ratio is a powerful predictor of debt pattern across the case load, looking at thousands of cases.

Part 2

Underlying Patterns of Arrearage Debt, Earnings, and Order Amounts

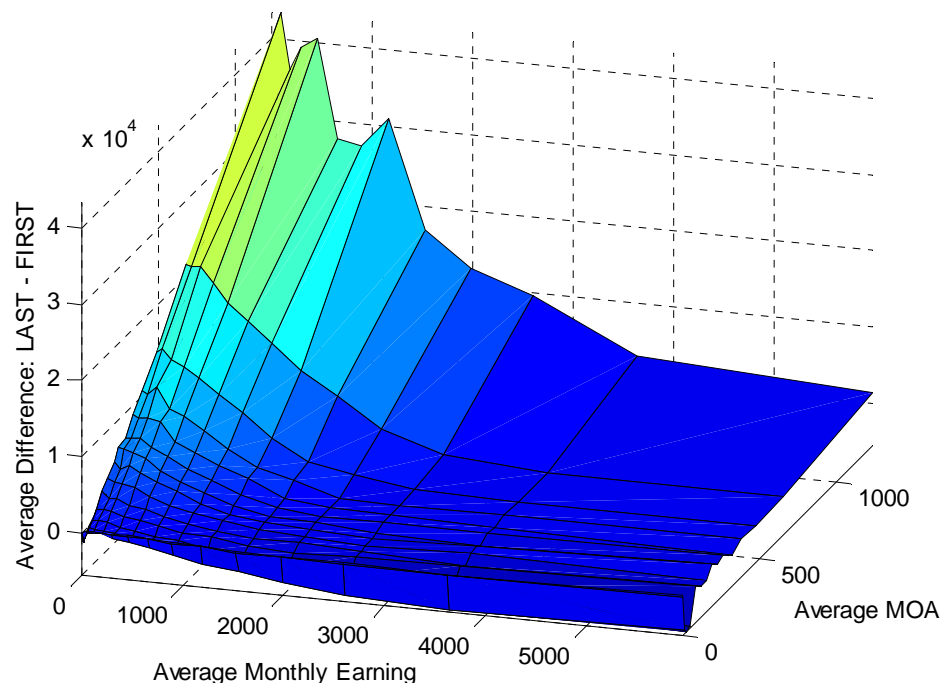
Carl Formoso

Project work in the past period has been a follow-up and expansion of a finding reported in the fourth progress report. This is found in Table 8, page 20 of the November 2001 Progress Report. The median ratio of Monthly Order Amount to monthly wage is reported as 1.721 for NCPs in the 'Increasing' debt pattern, but only 0.057 for NCPs in the 'Decreasing' debt pattern. Clearly it is rather easy for someone to pay out about 6% of their monthly income and extremely difficult for anyone to pay out 1.7 times their monthly income.

To assess the generality of this finding we assembled data for the entire cohort of 241,731 NCPs. We determined arrearage debt change over the 15 quarters of data by subtracting the last recorded debt from the first recorded debt. In this way we avoided the problem of missing data, except for 156 NCPs who were only in the data in one quarter, the selection quarter 95Q3. Thus this part of the study only involves the 241,575 NCPs who have a defined change in arrearage debt. For these NCPs we also determined average monthly earnings and average Monthly Order Amounts (MOA) over the 15 quarters. While there is considerable variability in this data, our approach is to suppress this variability in order to see underlying patterns which might help us better understand the interaction between these three factors.

Since taking a ratio can lead to extreme outliers, we first looked at the interrelation between earnings, MOA, and debt as shown in Figure 1. This

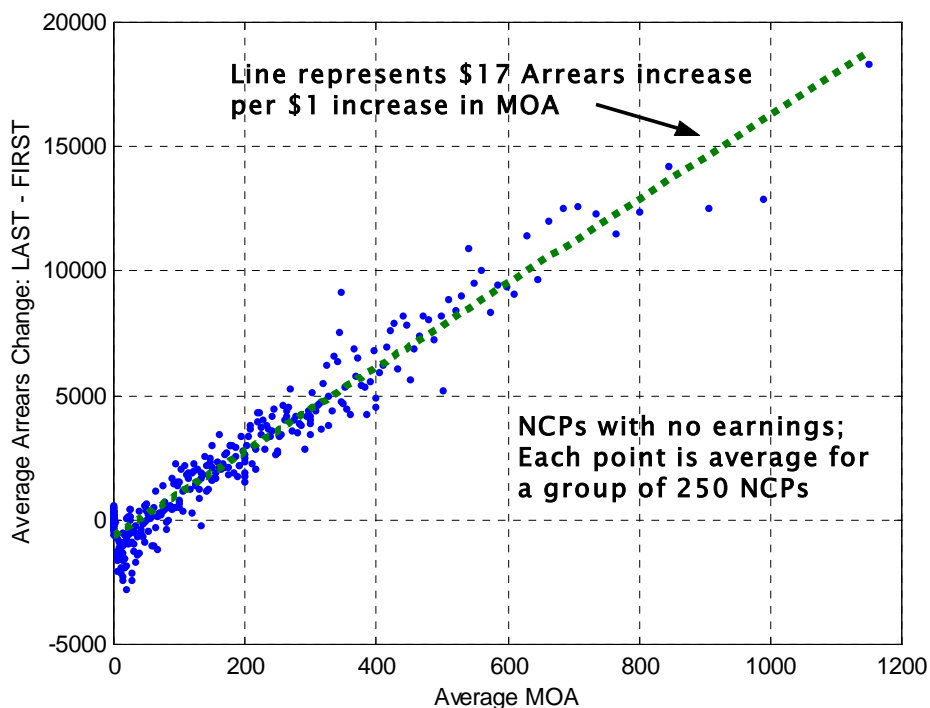
Figure 1: Average Arrearage Change Related to Earnings and MOA



shows dramatically that on average large increases in debt are associated with lower earnings and higher MOAs. The peak of the surface represents an average debt increase of about \$40,000 and is associated with monthly earnings of less than \$1000 and MOAs of more than \$1000. On the other hand there is a region of debt decrease, which may be difficult to see on the Figure, associated with higher earnings and lower MOAs.

We further examine the interrelation between earnings, MOA, and debt by seeing how debt varies with increasing MOA at various earning levels. Figure 2 shows this relationship for the 88,227 NCPs who had no reported earnings during the 15 quarters, that is, their average monthly earnings were \$0. In this Figure, NCPs were placed in order of increasing MOA and then averaged in groups of 250. There is a fairly linear relationship which is summarized by the dashed line representing a \$17 increase in arrears over the 15 quarters for each \$1 increase in MOA. This essentially gives us the steepness of Figure 1 in the MOA direction at \$0 average earnings.

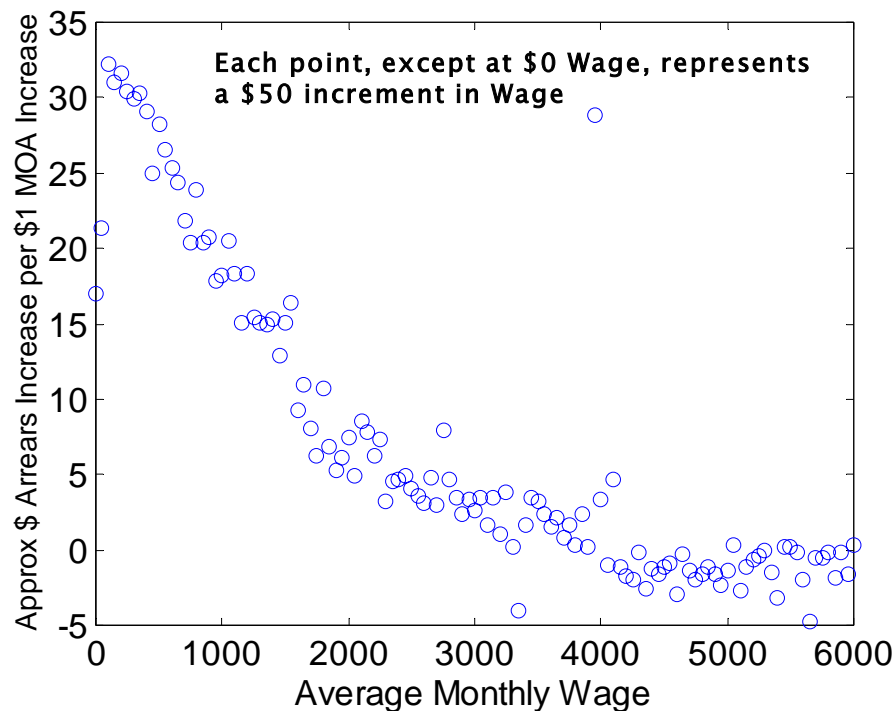
Figure 2: Arrearage Change by MOA at \$0 Earning



We repeat this process in \$50 increments of monthly earning to view the approximate steepness (as \$ arrears increase per \$1 increase in MOA) of Figure 1 as earning increases. This is shown in Figure 3. There are fewer NCPs at higher earnings and the relationship between MOA and debt is less linear than

in Figure 2, but this still gives us useful information. The striking feature of Figure 3 is the high marginal arrearage cost of an increase in MOA at low earnings and the small or zero marginal cost of an increase in MOA at higher earnings.

Figure 3: Marginal Arrearage Cost for MOA Related to Earnings

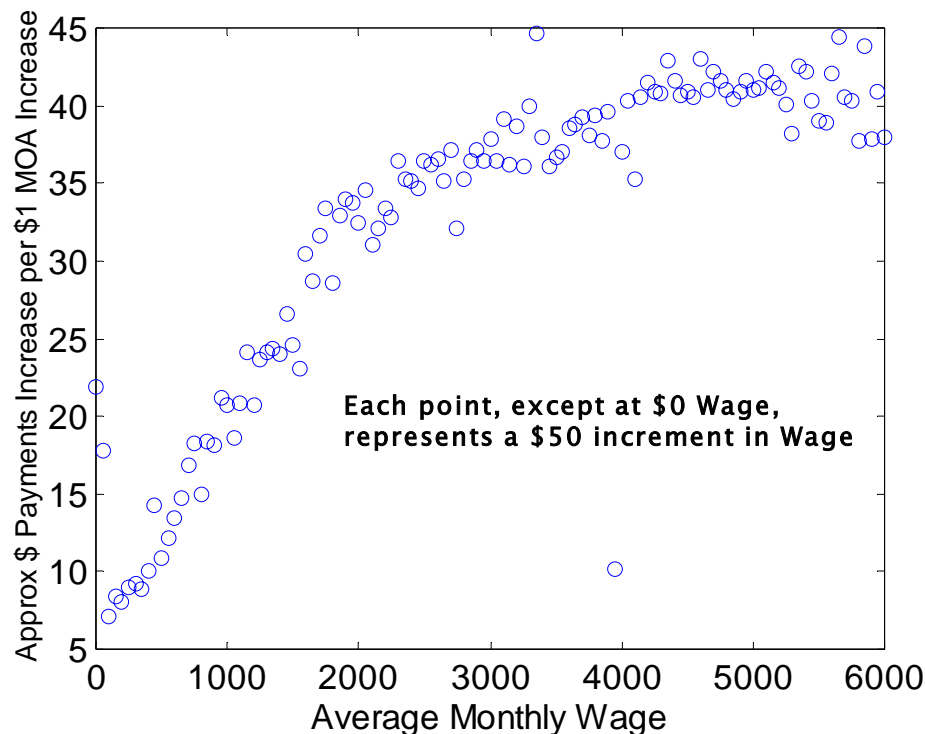


There are two anomalous features in Figure 3 which need to be explained. The first is the apparent rise in marginal arrearage cost from \$0 to \$100 earnings. This is because our best source of earnings data is from Employment Security Department (ESD) records, but some earnings do not have to be reported to ESD. Also we have no access to earnings information for wages paid outside of Washington State. Of NCPs with \$0 average monthly earning 43.5% are involved in initiating interstate cases, that is, the NCP is not in Washington State. 11% of the NCPs represented by the \$50 point in Figure 3 are not in Washington State. So these first few points really represent some unknown mixture of NCPs who have no, or very low, actual earnings and NCPs who have earnings, but there was no report to ESD. The second anomalous feature is the point at approximately \$4000 earning and \$29 marginal arrearage cost. Only 269 NCPs are included in this point; since we are averaging in groups of 250 (see Figure 2) this point cannot represent the underlying pattern.

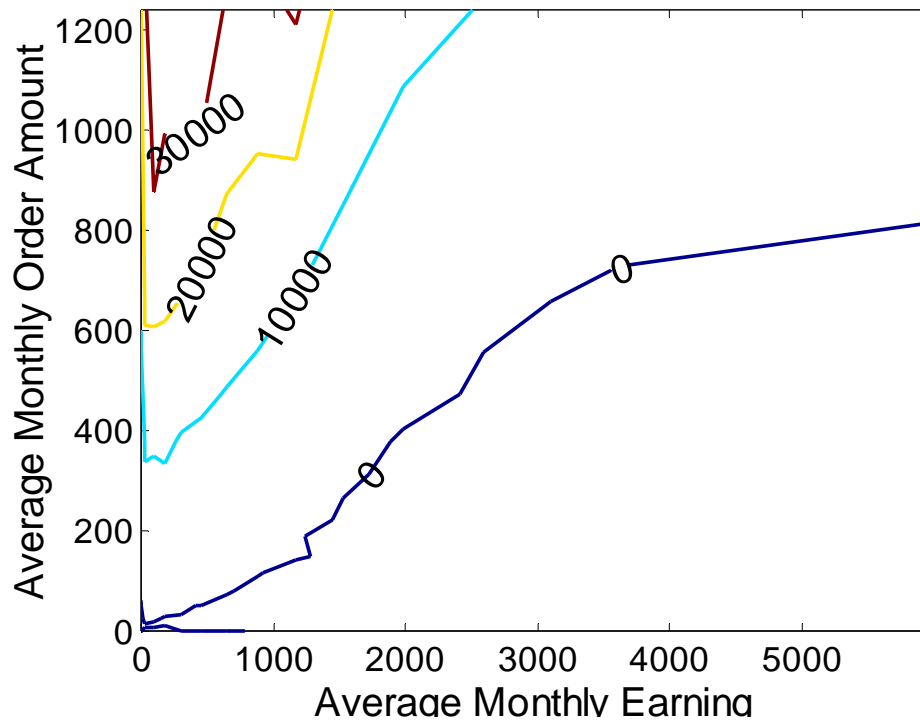
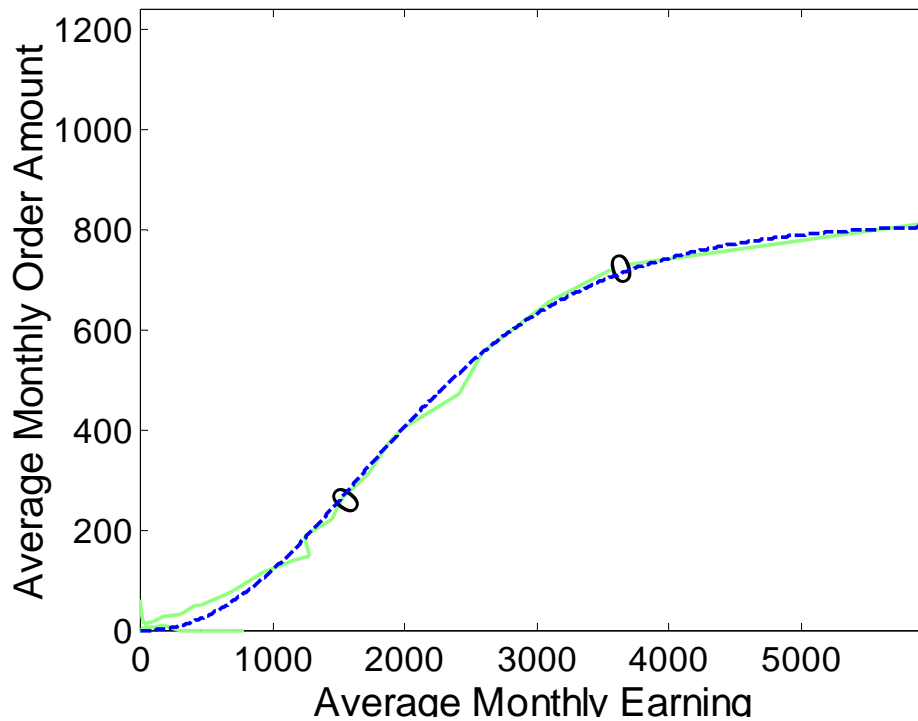
From this work we can also make implications about collections. If the MOA is increased by \$1 the maximum additional collections over 15 quarters is \$45. But not all NCPs are in DCS records for the entire 15 quarters. Taking the \$50 increments established in Figure 3 and determining the average number of quarters for each increment we can determine the maximum marginal

collections benefit from a \$1 increase in MOA for each increment. Subtracting from this the marginal arrearage cost shown in Figure 3 then gives us an estimate of the marginal increase in collections per \$1 increase in MOA. This is shown in Figure 4. At very low earnings the marginal increase in collections is small, less than \$10, where at earning above about \$4000 the implied collections are essentially at the maximum possible (the average number of quarters across the Figure is usually a little over 13).

Figure 4: Marginal Payments Benefit for MOA Related to Earnings



Going back to consider Figure 1 and using a different approach, we create the contour diagram in Figure 5. This shows us the shape of the surface at various levels of arrearage change and clearly shows the region where, on average, decreases in arrearage occur. The contour line labeled with “0” marks the border between increasing arrearage and decreasing arrearage. To the right and below this line arrears on average decreased during the 15 quarters. We will call this line the Zero Contour, but since it is just a graphics object we will make it more useful by creating a mathematical estimation to represent this line. This is the dashed line shown in Figure 6 and called the Zero Contour Estimate (ZCE). This mathematical representation allows us to classify each NCP into the region with increasing arrearage or into the region of no change or decreasing arrears. Above the ZCE are 163,651 NCPs with an average arrearage change of \$3,585, while on or below the ZCE are 77,924 NCPs with an average arrearage change of - \$532.

Figure 5: Contour View of Figure 1**Figure 6: Creating a Zero Contour Representation**

While this is useful, more information can be gained by comparing the ZCE – which is a relation between earning and MOA – to how the MOA is actually set relative to earnings. This is shown in Figure 7 where for the actual MOA the NCPs are ordered by increasing earnings and averaged in groups of 250. This strikingly shows a region where earnings are low and where on average the MOA is set above the ZCE, and a region where earnings are high and the MOA is set below the ZCE. The cross-over point is interesting and to establish this point using all the data we create in Figure 8 a mathematical representation of the actual MOA data. The dashed line in Figure 8 is called the Actual MOA Estimate (AME) and represents the underlying pattern of how MOA is set relative to earnings.

Figure 7: Average Actual MOA Related to Earnings and ZCE

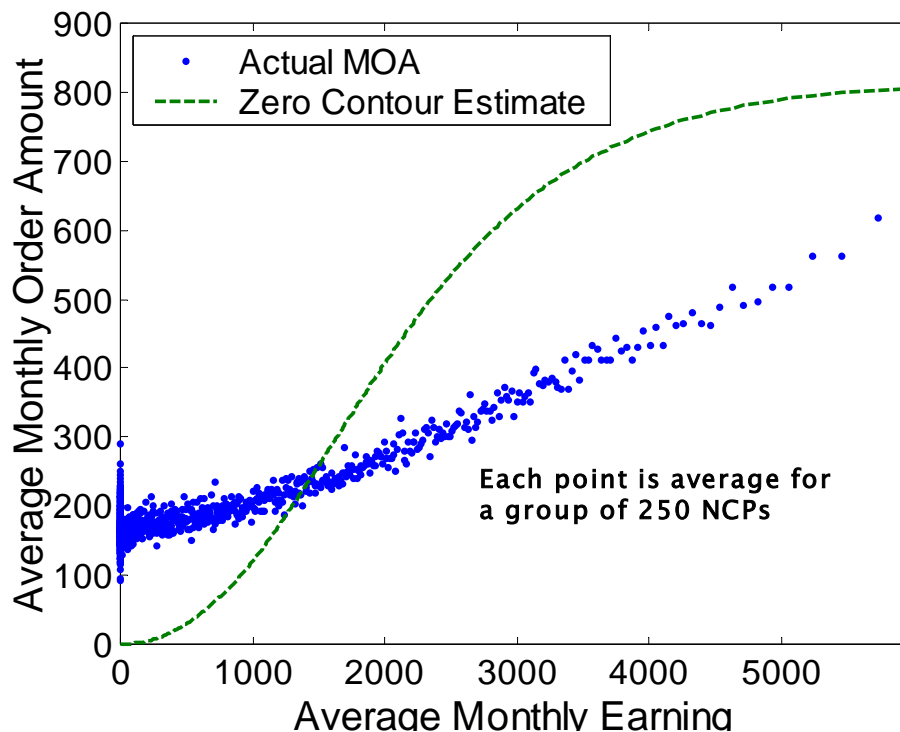


Figure 8: Creating a Representation of Actual MOA

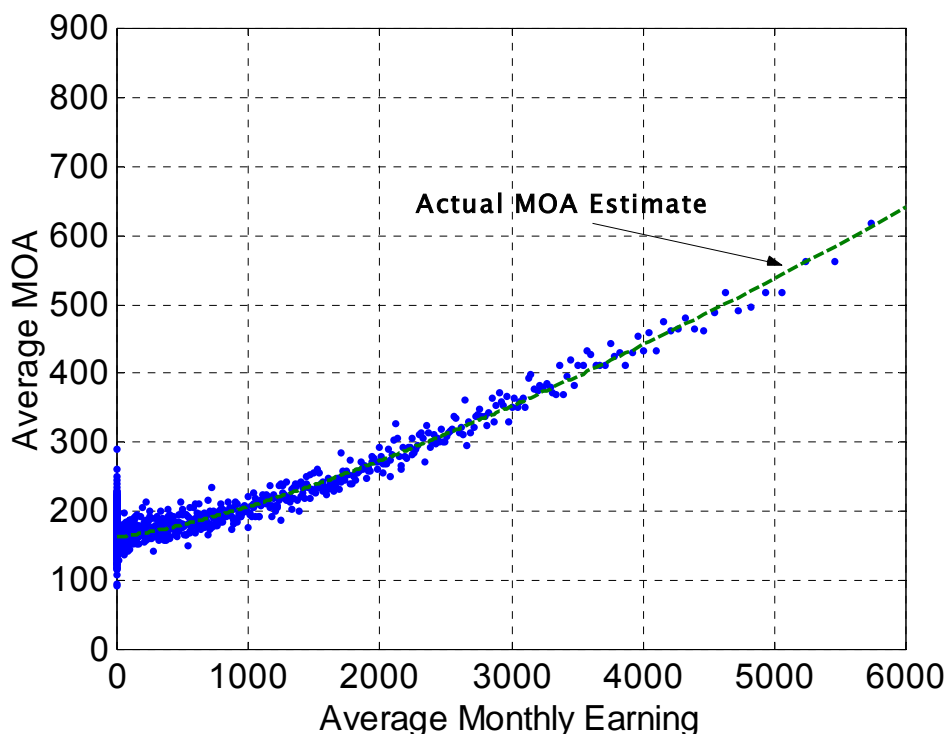


Figure 9 then compares the ZCE with the AME and establishes the cross-over point at about \$1403 monthly earning. One way to view these two lines is that the ZCE represents what people can do, while the AME represents what they are being asked to do. Below \$1400 monthly earning they are being asked to pay more than they can and arrearages increase. Above \$1400 monthly earning they are being asked to pay less than they can and arrearages decrease or stay the same.

Table 1 divides the 241,575 NCPs into four groups by earning. Those with \$0 average monthly earning are separated out because as mentioned above they are really an unknown mixture of NCPs who actually had no income and NCPs who had income outside of our records access. The group with average monthly earning above \$6000 is separated out because the Zero Contour on Figure 5, on which the ZCE is based, is only known up to \$6000. For the 105,707 NCPs with average monthly earning greater than \$0 but not more than \$1403 arrearage debt increased on average \$3484 over the 15 quarters for a total of \$368 million. Indicating individual variability, 61.5% of this group had an actual increase in arrearage debt, while 25.7% had an actual decrease. For the 46,869 NCPs with average monthly earning greater than \$1403 but not more than \$6000 arrearage debt decreased on average \$398 over the 15 quarters for a total of - \$18.7 million. Indicating individual variability, 28.9% of this group had an actual increase in arrearage debt, while 71.1% had an actual decrease or no change in arrearage. The NCPs with earnings between \$0 and \$1403 were expected to pay an average 40.1% of their earnings in MOA, while the NCPs

with earnings between \$1403 and \$6000 were expected to pay an average 12.5% of their earnings in MOA. The group with earnings above \$6000 were expected to pay an average 8.8% of their earnings in MOA.

Figure 9: Representations of Actual MOA & Zero Contour

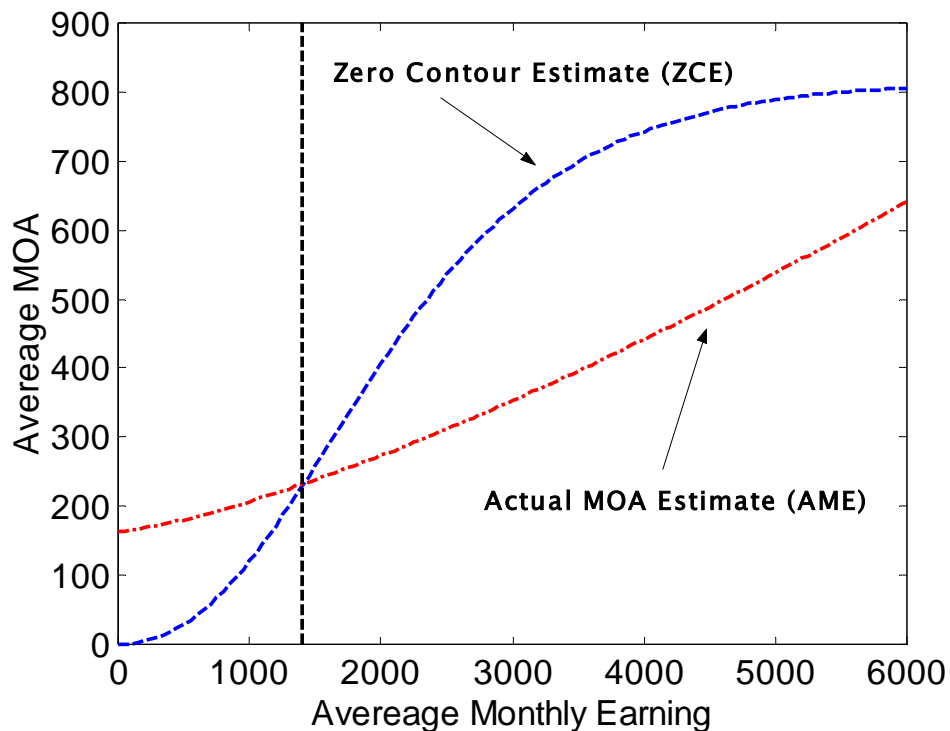
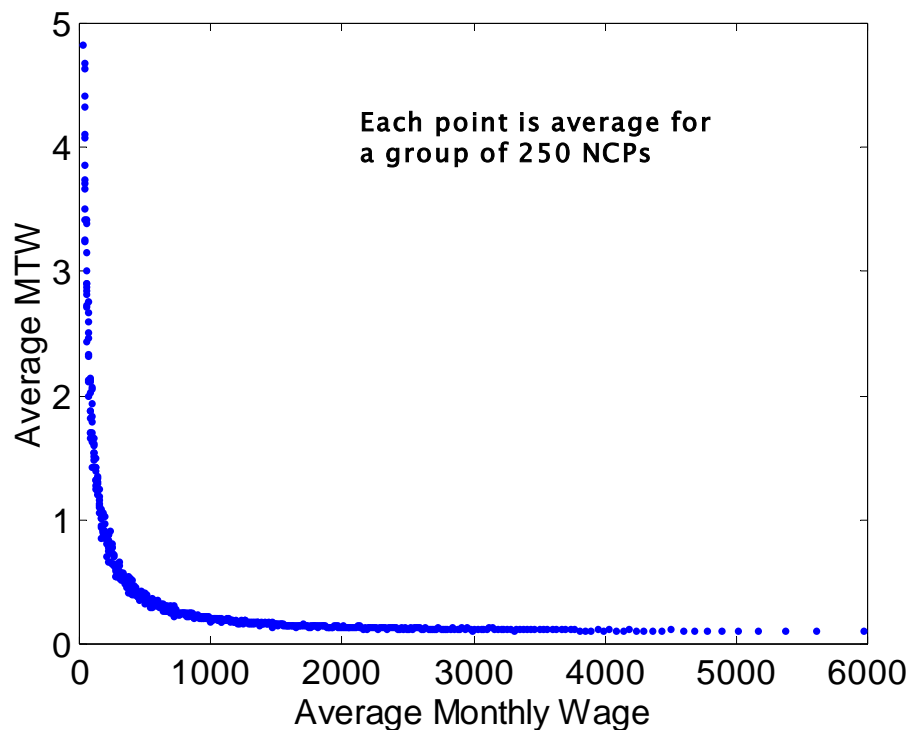


Table 1: Characteristics of Four Wage Regions

| | Wage Region | | | |
|-------------|-------------|------------|-------------|-----------|
| | \$0 | \$0 - 1403 | \$1403 - 6K | > \$6K |
| Number | 88,227 | 105,707 | 46,869 | 772 |
| d (Arrears) | | | | |
| Avg | \$2,217 | \$3,484 | -\$398 | -\$20 |
| Sum | \$196 M | \$368 M | -\$18.7 M | -\$15.4 K |
| Percent w | | | | |
| d>0 | 47.7% | 61.5% | 28.9% | 18.9% |
| d=0 | 23.1% | 12.8% | 28.2% | 54.1% |
| d<0 | 29.2% | 25.7% | 42.9% | 26.9% |
| MOA | \$170 | \$181 | \$322 | \$795 |
| Wage | \$0 | \$453 | \$2,567 | \$9,027 |
| MTW | N/A | 40.1% | 12.5% | 8.8% |

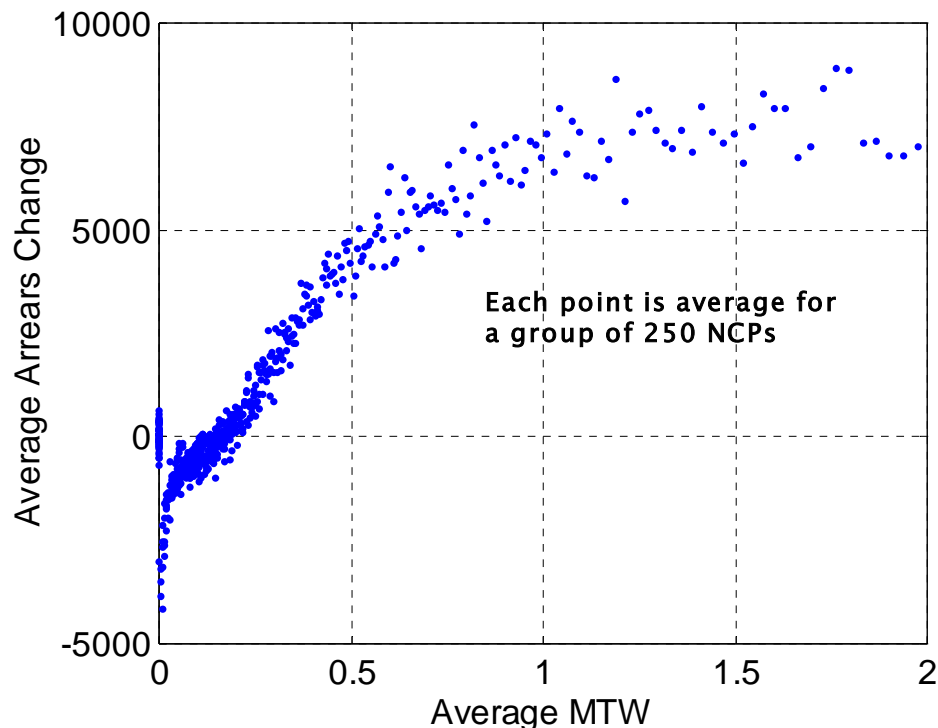
Excluding NCPs with less than \$1 average monthly earning we determine the ratio of MOA to wage (MTW) for each individual, order individuals by increasing monthly earnings, and then average in groups of 250. The results are shown in Figure 10 where it is clear that those with lowest earnings are expected to pay an inordinate portion of their earnings. The data crosses the 0.5 ratio at about \$375 monthly earnings – that is anyone earning \$375 per month or less is on average being expected to 50% or more of their gross earnings in child support. The data crosses the 1.0 ratio at about \$175 monthly earning. NCPs earning only \$175 per month are on average expected to pay all of their gross monthly income in child support.

Figure 10: MTW Ratio Related to Earnings



Results are going to be disappointing with these expectations. Figure 11 shows how arrearage results are related to MTW and confirms that as MTW rises arrearage debt will tend to increase. The leveling off of arrearage change above an MTW of about 1.0 is probably due to a minimum order being set regardless of income.

Figure 11: Arrearage Change Related to MTW Ratio



Since NCPs may have hidden income we can not explicitly show that those with low reported earnings are unable to pay, but we do have strong circumstantial evidence that this is the case. Through DCS records for 95Q3 and through other data sources we have compiled a list comprising eight possible barriers to payment for each NCP. These are given in Table 2. When each of these barriers is viewed in relation to average monthly earnings those with lowest earnings also have an inordinate share of each of the eight barriers. Figure 12 shows the average number of barriers per NCP in relation to average monthly earning. Figure 13 shows the average MTW in relation to the number of barriers. The conclusion is inescapable that those with the most problematic lives as indicated by the barriers and the lowest incomes as indicated by ESD reported earnings, those with the least ability to pay, are being expected to pay an inordinate portion of their income towards child support.

Table 2: Barriers to Payment of Child Support

| Barrier | Data Source | Detail |
|-------------------------|---------------------|---------------------|
| Welfare Use | Eligibility Records | Any use 93Q4-95Q3 |
| Multiple NCP Cases | 95Q3 DCS Records | More than one case |
| Cases as CP | 95Q3 DCS Records | Any case |
| Limited English | 95Q3 DCS Records | Language indicator |
| Alcohol/Substance Abuse | NADB Data* | Any related program |
| Disability | NADB Data* | Any related program |
| Food Stamps | NADB Data* | Any use |
| Public Services | NADB Data* | More than 2** |

* NADB Data – Cross-program use for State Fiscal Year 1994; see 2nd Progress Report on this project submitted October 2000.

** Use of more than two public service programs after exclusion of those already listed in the Table.

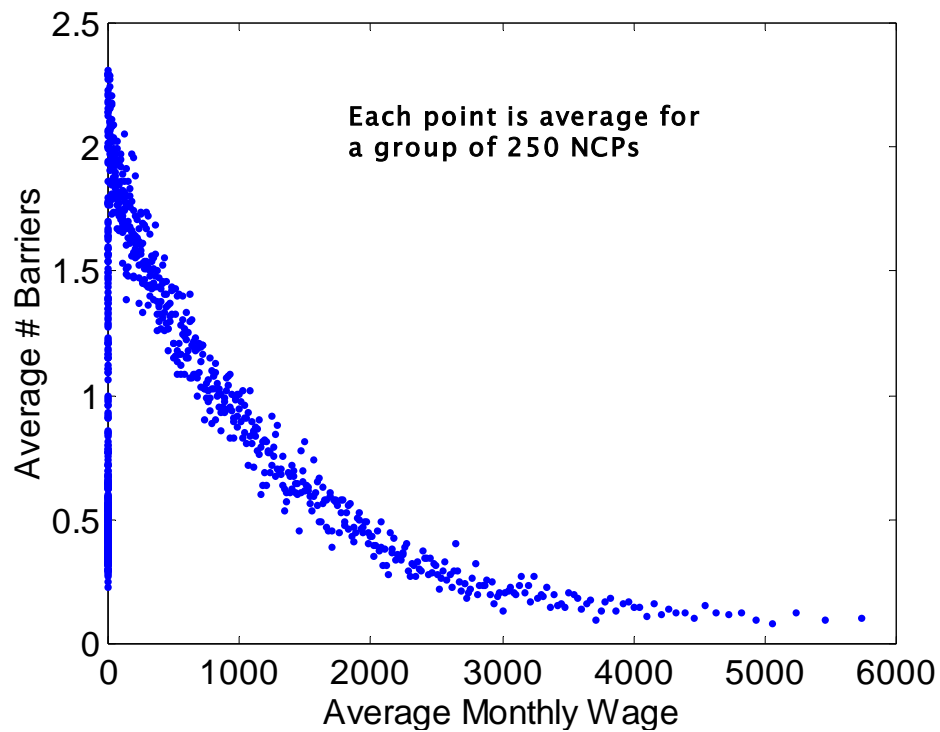
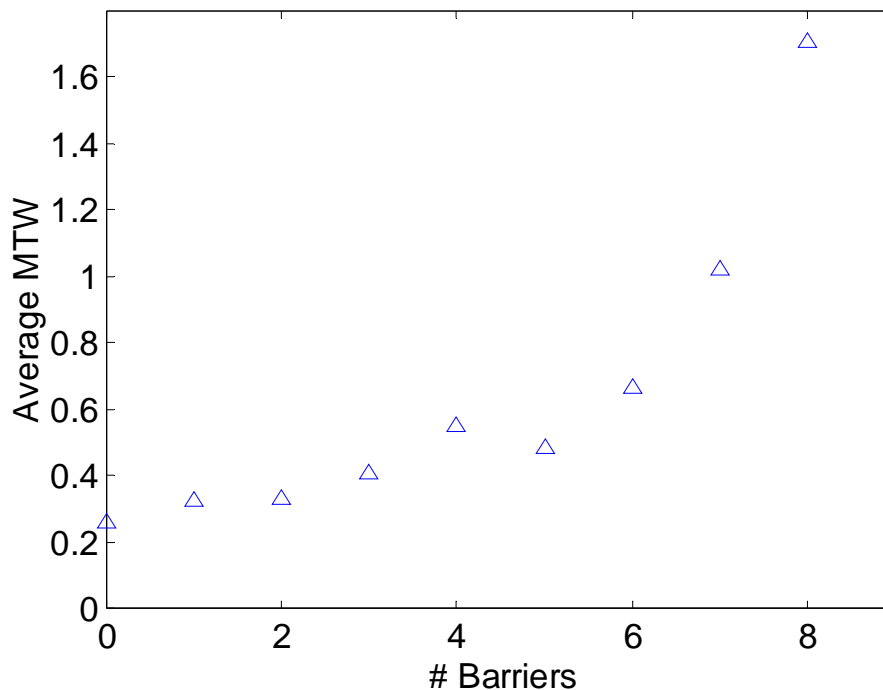
Figure 12: Number of Barriers per Client Related to Earnings

Figure 13: MTW Ratio Related to Payment Barriers

However, an interesting observation emerges when we look at the interrelationships between MTW, barriers, and arrearage change. Figure 14 shows a contour plot where the contours are arrears change as related to barriers and MTW. The observation is that barriers are not very important when MTW is low, but become important at higher MTW. At MTW below 0.2 the contours are almost parallel to the barriers axis, which means that as the number of barriers increases arrearage change is only slightly affected. At MTW above about 0.4 the number of barriers can have a strong influence on arrearage change. If we follow an imaginary line at MTW=0.7 across the Figure as the number of barriers increases, the average arrearage change starts off at about \$7000, increases to \$8000, then to \$10000, then begins to drop off to \$8000, and \$6000, and ends up at about \$5000. A drop in MOA as number of barriers increases appears to be responsible for the drop in arrearage change after about 2 barriers. The conclusion here is that even those with limited ability to pay apparently do pay child support when it is a low percentage of their monthly income. At the 8.8% payment required of those earning over \$6000 per month (see Table 1) the number of barriers appears to have essentially no affect on arrearage behavior. At the 40% average payment required of those earning \$1400 or less per month (see Table 1) barriers are important.

Figure 14: Arrearage Change Related to MTW and # of Barriers